IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s):	Allen et al.
Case:	YOR920030175US1
Serial No.:	10/661,041
Filing Date:	September 12, 2003
Group:	2811
Examiner:	Cuong Q. Nguyen

Title: Techniques for Patterning Features in Semiconductor Devices

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AFFIDAVIT UNDER 37 C.F.R.§1.131

We, the undersigned, hereby declare and state as follows:

1. We are the named inventors of the above-referenced U.S. patent application.

2. On or around November, 2000, we prepared the enclosed document (labeled "Exhibit 1") that evidences a reduction to practice of an invention falling within one or more of the claims of the above-referenced application.

3. On page 3 of the document, an image is shown (situated on the left-hand side of page 3) (hereinafter "the image") that illustrates etching through a photoresist layer (top layer), an antireflective material layer (middle layer) and a portion of a substrate layer (lower layer).

4. As is shown in the image, a critical dimension reduction occurred during etching of the antireflective material layer. This is further evidenced by the caption to the image, which indicates a -30 nanometer critical dimension bias.

5. As shown in the image, critical dimension reduction occurred during etching of the antireflective material layer, as etching is shown to have ceased just following passage through the antireflective material layer.

6. All statements made herein of our own knowledge are true, and all statements made on information and belief are believed to be true.

7. We understand that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001, and may jeopardize the validity of the application or any patent issuing therefrom.

Date: _____ _____
Scott D. Allen

Date: _____ _____
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Date: _____ _____
Steven J. Holmes

Date: _____ _____
Arpan P. Mahorowala

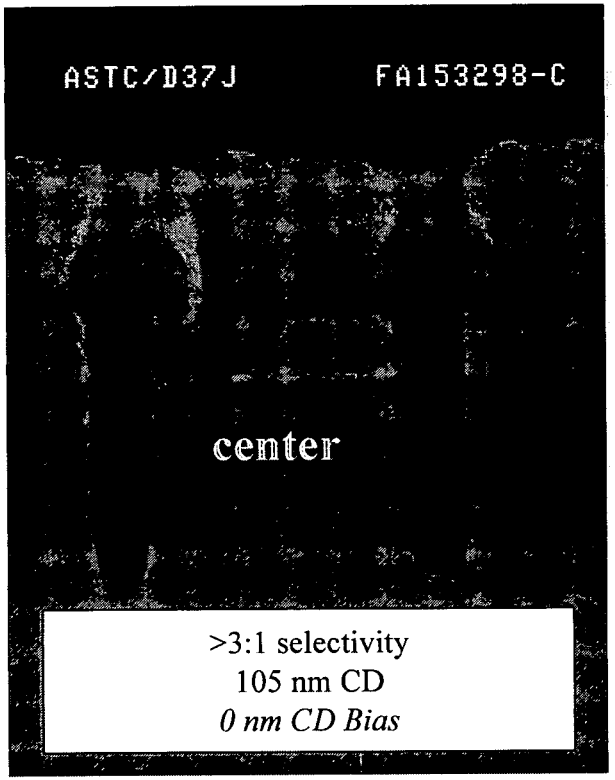
Date: _____ _____
Dirk Pfeiffer

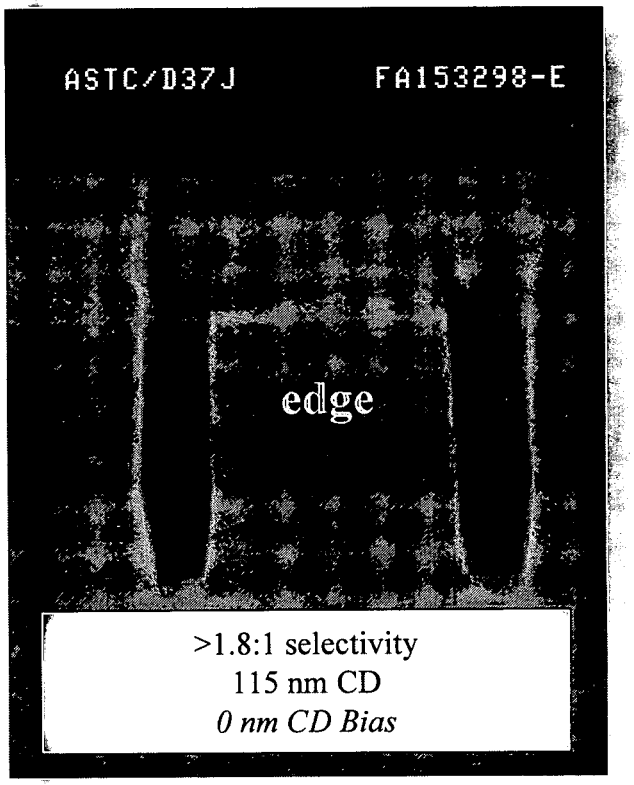
Date: _____ _____
Richard Stephan Wise

Exhibit 1

PAR-710 Resist
(350 nm post develop)
300 nm TERA

TERA Development
Fluorocarbon Open Etch Processes - CHF_3 Base



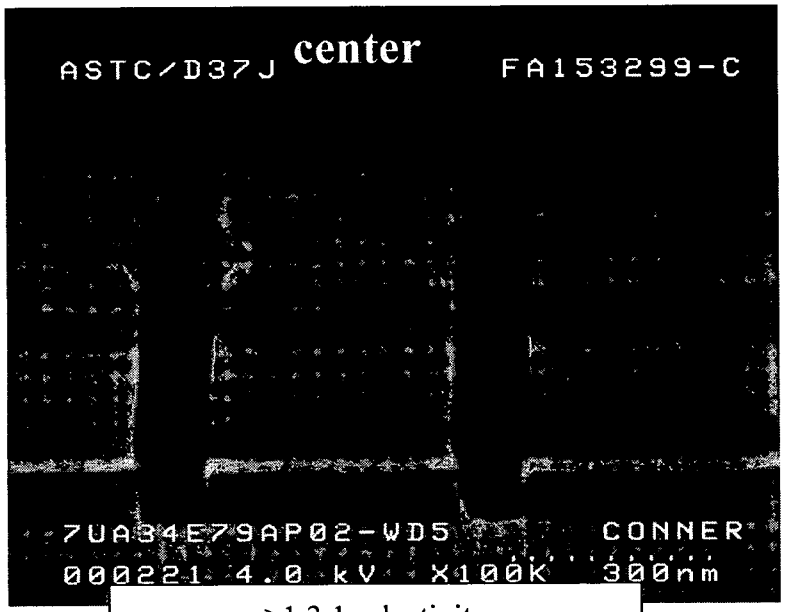


TEL 85 Process:
SiC: 60 secs / 40 mT / 1.4kW / 5 C_4F_8 / 10 CHF_3 / 100 N_2 / 5 O_2 / 150 Ar

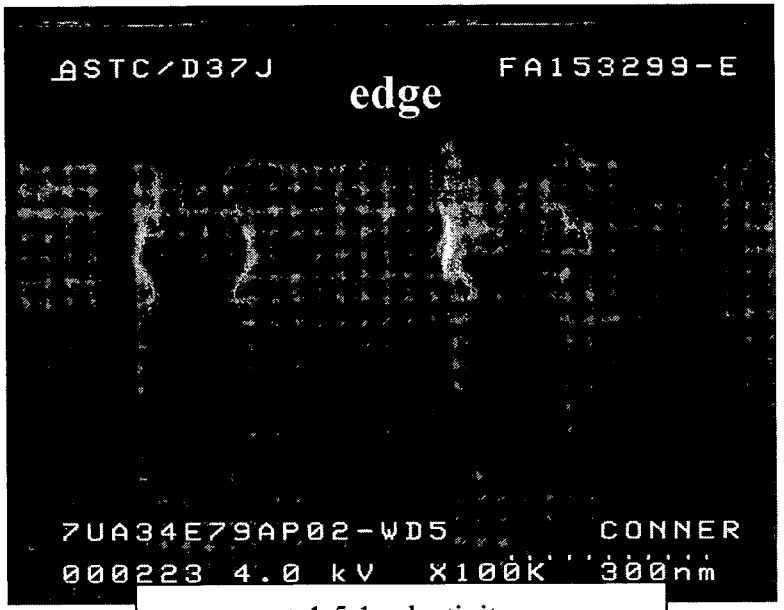
=> Increase τ_{RES} results in much improved c/e distribution, lower overall selectivity
=> Too much polymer in center, decrease τ_{RES} to improve profile (CGF system)

PAR-710 Resist
(350 nm post develop)
300 nm TERA

TERA Development
Fluorocarbon Open Etch Processes - CH_2F_2 Base



>1.3:1 selectivity
115 nm CD
0 nm CD Bias



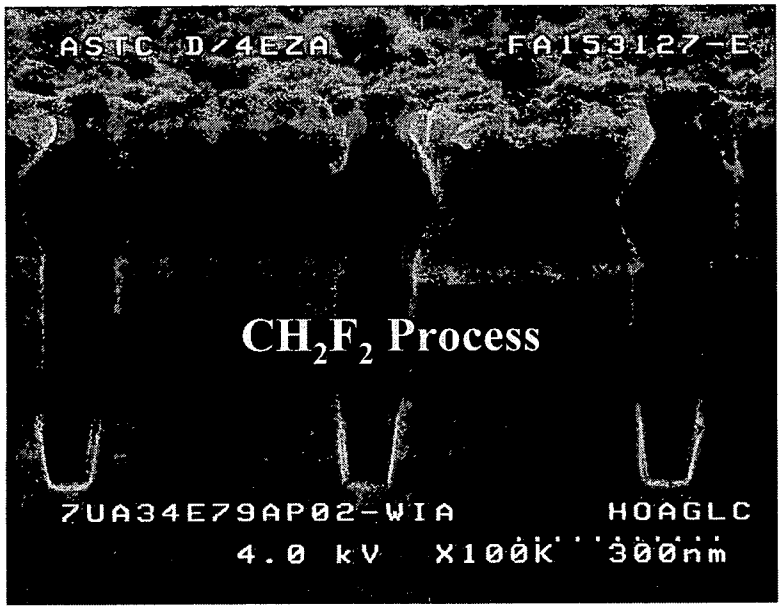
>1.5:1 selectivity
120 nm CD
0 nm CD Bias - Bowed TERA Profile

TEL 85 Process:
SiC: 60 secs / 40 mT / 1.4kW / 4 C_4F_8 / 10 CH_2F_2 / 100 N_2 / 5 O_2 / 200 Ar

=> Addition of 20% N_2 , reduction 20% C_4F_8 to CH_2F_2 base chemistry eliminated previous CD bias
=> Much reduced selectivity (extreme sensitivity to C_4F_8 flow)

PAR-710 Resist
300 nm TERA

TERA Development
F Open Etch Processes



>2:1 selectivity
(200 nm PR + 80 nm Polymeric Cap)
-30 nm CD Bias (c/e similar)

TEL 85 Process:
SiC: 60 secs / 40 mT / 1.4kW / 5 C_4F_8 / 10 CH_2F_2 / 80 N_2 / 5 O_2 / 200 Ar

=> Reduce CH_2F_2 flow (less polymer)
=> Flatten profile (similar to earlier experiments)
=> Reduce CD Bias

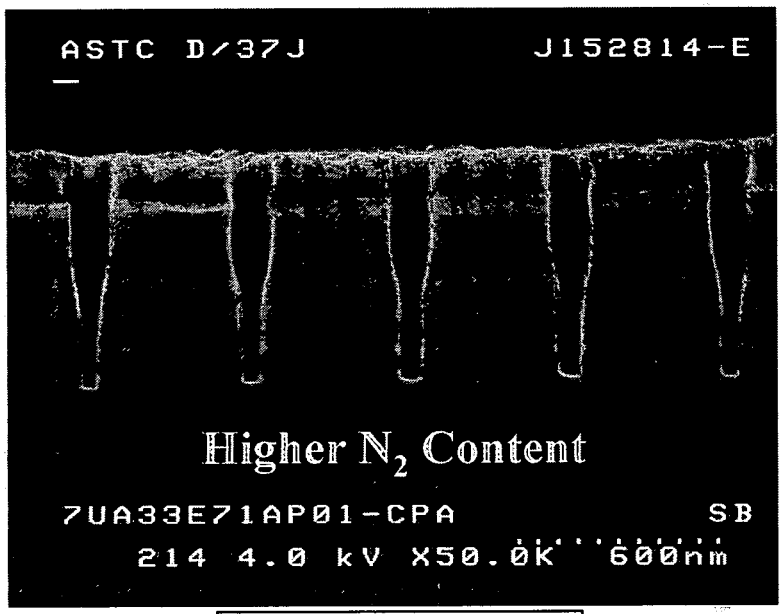
>2:1 selectivity
(220 nm PR Remains)
-20 nm c CD Bias, -120 nm e CD Bias

TEL 85 Process:
SiC: 60 secs / 40 mT / 1.4kW / 5 C_4F_8 / 10 CHF_3 / 100 N_2 / 5 O_2 / 250 Ar

=> Increase τ_{RES} (Ar/N_2 flow) (based on previous)
=> Flatten profile (similar to earlier experiments)
=> Reduce CD Bias

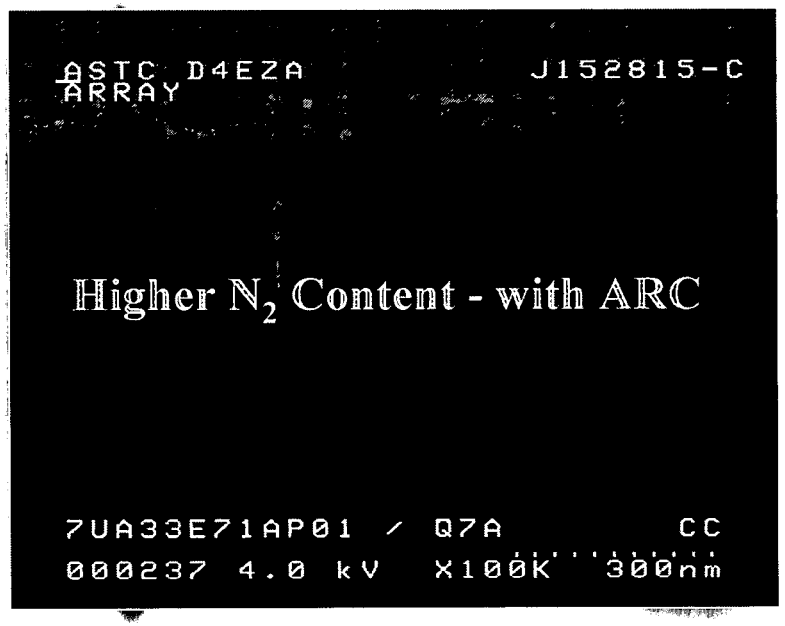
PAR-710 Resist
300 nm TERA

TERA Development
F Open Etch Processes



>1.4:1 selectivity
(370 nm into BSG)
center just etch, low CD

TEL 85 Process:
SiC: 90 secs / 40 mT / 1.4kW / 5 C_4F_8 / 10 CHF_3 / 80 N_2 / 5 O_2 / 200 Ar



>1.4:1 selectivity
(190c, 300e nm into BSG)

TEL 85 Process:
ARC: 90 secs / 150 mT / 500 W / 10 O_2 / 500 Ar / 20 CH_2F_2
SiC: 90 secs / 40 mT / 1.4kW / 5 C_4F_8 / 10 CHF_3 / 80 N_2 / 5 O_2 / 200 Ar

=> Continue N_2 increase
=> Tune c/e overetch
=> Flatten profile (similar to earlier experiments)